

The Role of Physical Activity in Primary School Students' Academic Achievement

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Abstract

Regular physical activity is widely recognised as beneficial not only for motor skills but also for cognitive and emotional development (Arday 2014). Recent research has examined the effects of pre-learning exercise, its impact on concentration, and children's awareness of these benefits (Daniel et al. 2022; Bartholomew 2011; Kertész 2022). Our study aimed to explore how schoolchildren perceive the role of regular exercise in their academic performance and everyday lives – whether they regard it as leisure, a compulsory task, or a supportive habit for learning. Children's attitudes and motivation may determine the long-term role of physical activity, while teachers' integration of exercise into the classroom (e.g., short breaks or activating tasks) may further enhance attention and learning. This paper presents the results of a cross-sectional questionnaire, conducted in December 2024 with 145 students from urban and rural schools (boys $n = 88$, girls $n = 57$, grades 5-8). The questionnaire assessed sporting habits, perceptions of PE classes, and subjective evaluations of concentration before and after PE. Descriptive statistics, paired t-tests, and chi-square tests were applied. Results showed that 79.3% of students “always” and 17.9% “occasionally” enjoy sports. Parents viewed regular exercise as important (54.5%) or partially important (40.7%). Overall, 86.1% of respondents considered PE lessons useful. However, no significant differences were found in concentration before vs. after PE, either overall or by grade. In conclusion, students consistently value PE positively, but short-term improvements in concentration were not supported. Long-term interventions and objective performance measures are recommended to examine potential cognitive benefits.

Keywords: regular physical exercise; cognitive skills; academic performance

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Introduction

A positive attitude toward sports and the active use of leisure time must be fostered from an increasingly younger age (Bíró 2018). The significance of sports in the value system of younger generations shows a declining trend, indicating that an increasing number of alternative leisure options are available to youth, competing

with sports (Bicsérdy 2002). Nevertheless, regular physical activity is a fundamental human need that not only affects motor skills but also promotes cognitive and psychological development (Gao et al. 2018; van den Berg et al. 2016).

Numerous studies have confirmed that sports have not only physiological but also cognitive benefits, particularly in terms of attention, working memory, and processing speed (Cheng et al. 2025; Contreras-Osorio et al. 2021; Gao et al. 2018; van den Berg et al. 2016). The mechanisms of physical activity include increased cerebral blood flow, enhanced production of neurogenic factors (e.g., BDNF), and the promotion of neural plasticity, all of which contribute to more effective learning processes (Hillman, Erickson and Kramer 2008).

From a psychological perspective, engaging in sports may improve self-esteem, reduce anxiety, and enhance coping strategies (Kovács and Nagy, 2015). These psychological changes also indirectly influence academic performance, as more motivated and self-confident students tend to direct their attention more effectively and participate more actively in educational processes.

In recent years, a growing number of international studies have focused on the short-term, immediate effects of physical activity on cognitive performance in learning situations. The experimental program by Garcia-Hermoso et al. (2020) demonstrated that beginning the school day with morning exercise improved selective attention and concentration capacity, particularly when the program was sufficiently intense. The meta-analysis by Song et al. (2023) showed that physical activity can enhance executive functions in children, especially those related to self-control and working memory.

Physical education (PE) in schools thus has a dual function: on the one hand, it plays a crucial role in promoting a healthy lifestyle; on the other hand, it may contribute to academic achievement. In pedagogical practice, however, this latter function is often underemphasised, with PE frequently interpreted as a setting for physical development alone. Yet, mounting evidence from the past decade supports that incorporating regular physical activity into the teaching process – even in the form of short, activating exercises – can aid knowledge acquisition and help sustain student attention (Mavilidi et al. 2018).

The research conducted by Mann, Williams, Ward, and Janelle (2007) aligns with earlier studies that investigated the relationship between athletes' performance and learning effectiveness. Their findings revealed that elite athletes exhibit higher cognitive performance in sport-specific situations compared to average athletes or the general population. This phenomenon suggests that the experiences gained in sports activities may transfer to learning situations as well.

In light of the above, our study aimed to explore whether students in grades 5 to 8 of primary school experience any change in their concentration before and after PE lessons, regardless of their individual sports habits. Our hypothesis assumed that students would perceive a subjective difference in their concentration levels before and after PE classes. Furthermore, we presumed that students' perceptions of the relationship between physical activity and cognitive abilities would vary significantly based on gender and grade level.

Objectives and Hypotheses

The research conducted by Mann, Williams, Ward, and Janelle (2007) is consistent with previous studies examining athletes' performance and the effectiveness of learning. Their findings indicate that elite athletes demonstrate higher cognitive performance in sport-specific situations than average athletes or the general population. In light of this, we were interested in whether students in grades 5 to 8 of primary school experience any change in their concentration before and after PE lessons.

We hypothesised that children would subjectively perceive differences in their ability to concentrate during lessons held before and after Physical Education classes. Furthermore, we assumed that children's perceptions of the relationship between physical activity and cognitive abilities would show significant differences by gender and age group.

Materials and Methods

Sampling

The study involved students of grades 5 to 8 from both urban and rural primary schools, using a questionnaire-based data collection method. Out of the 300 questionnaires distributed, a total of 145 evaluable responses were received ($N = 145$), including 88 boys and 57 girls. Therefore, the sample was not completely balanced in terms of gender. During the survey, efforts were made to ensure geographical diversity: participants included students from the capital, county seats, large and small towns, and villages. This allowed for the examination of potential correlations between the type of residence and students' attitudes toward sports and physical education.

Data collection was voluntary and conducted with the written consent of the parents. All data were handled anonymously and in accordance with applicable ethical and data protection regulations.

Method

The data collection for the questionnaire took place in December 2024. The timing of the survey was a deliberate decision: by this point in the academic year, students had already spent approximately three months in school, providing them with sufficient experience to give a realistic account of how physical education lessons affect their classroom concentration and the development of their cognitive abilities. Had the survey been conducted at the beginning of the school year, students might not have had enough relevant experience, while a later date could have distorted results due to end-of-year fatigue or increased academic pressure. Therefore, conducting the survey in December offered a balanced opportunity to capture both experience and recent impressions.

A quantitative research method was employed, involving written responses to a structured questionnaire. The instrument was developed by the authors and con-

tained only closed-ended questions. A four-point Likert scale was used to record the participants' responses, allowing for a nuanced but guided assessment of attitudes and opinions, while avoiding the possibility of selecting a neutral midpoint.

The questionnaire was organised into several thematic blocks. One section explored the students' and their families' sporting habits (e.g., frequency of physical activity, types of sports practiced, and the extent to which parents consider physical activity important for their children). Another section addressed students' attitudes toward PE classes, their perceived usefulness, and whether students noticed any changes in their concentration, attention, or academic performance following PE lessons. Additionally, students' subjective views were examined regarding the extent to which they believe physical activity influences learning success and the development of cognitive skills.

The completion of the questionnaire was entirely voluntary and entailed no obligation for participants. This approach allowed students to share their opinions freely and without external pressure, thereby increasing the reliability of the data. Student motivation was also supported by the fact that the questionnaire was brief and the questions were clearly and unambiguously worded.

The data collection was conducted online during "digital culture" lessons at school, which proved beneficial for several reasons. First, it ensured participant anonymity, thereby reducing the likelihood of socially desirable responses. Second, the online format made the process quicker and simpler, as the questionnaire was accessible from any internet-enabled device. Digital data entry also ensured that responses were immediately stored in the database, eliminating the potential for errors and delays associated with paper-based methods. This not only facilitated the researchers' work but also enhanced the efficiency of data processing and analysis.

This methodological approach enabled not only the acquisition of a descriptive overview of students' attitudes and habits but also the identification of causal patterns and relationships among sports, PE classes, and academic performance.

Type of residence	n-type of residence	Grade	n- grade
Capital city	79	5.	45
County seat	9	6.	27
Large city	10	7.	8
Small town	3	8.	65
Village	44	total:	145

Tab 1. Characteristics of the sample

Data Processing and Analysis

Following data collection, the responses were initially recorded and organised with Microsoft Excel, which enabled the calculation of basic descriptive statistical indicators (e.g., percentage distributions, means, frequencies). For more in-depth analyses focusing on correlations, IBM SPSS Statistics 20 software was employed. Using this tool, statistical tests were conducted to examine relationships between various variables (e.g., chi-square tests, t-tests), which helped determine the extent to which factors such as gender, grade level, or sporting habits influenced students' responses.

The significance level was set at $p < 0.05$ for all statistical analyses.

Results

Based on the results obtained, a large proportion of the surveyed students reported that they always (79.3%) or occasionally (17.9%) enjoy participating in sports, while only a small minority (2.8%) indicated that they do not enjoy physical activity at all. These findings suggest that regular physical activity remains a fundamental need for children in this age group. Accordingly, physical education teachers and PE lessons play a key role in ensuring that children are introduced to and develop a positive attitude toward a variety of physical activities, helping to integrate regular exercise into their everyday lives.

It is also important to note that similar results were found regarding parental attitudes. According to the students' reports, 54.5% of parents consider regular physical activity important, 40.7% regard it as partially important, and only 4.8% do not actively encourage regular exercise. These data highlight that physical activity is considered important by most families, and they are aware of its positive effects.

Organised activities with personality-shaping potential, such as PE classes, have a significant impact on children's habits and attitudes. Therefore, our study also examined how students perceive the role of PE in public education and how useful they find these classes. The results indicate a generally positive evaluation of school PE: only 13.9% of students did not find PE lessons useful, while 86.1% considered them beneficial.

Grade	yes, always	mostly yes	nearly	never
5	53.3 %	40.0 %	6.7 %	0.0 %
6	51.9 %	44.4 %	0.0 %	3.7 %
7	37.5 %	50.0 %	12.5 %	0.0 %
8	41.5 %	40.0 %	15.4 %	%

Tab 2. Evaluation of the perceived usefulness of physical education lessons by grade level

The evaluation of the usefulness of PE lessons by grade level is shown in Table 2. The data suggest that students in lower grades are more likely to perceive PE lessons as useful in percentage terms. In grade 5, 93.3% of students reported that

they “always” or “mostly” found the lessons useful. In grade 6, this rate was even higher, at 96.3%. For grade 7, the proportion was slightly lower at 87.5%, while in grade 8 it decreased further to 81.5%.

To analyse perceptions of PE lesson usefulness across grades, a contingency table and chi-square test were used. The analysis did not reveal any statistically significant differences between grade levels ($\chi^2(9) = 8.41$; $p = 0.494$), indicating that students' responses were distributed similarly regardless of grade.

The results of the paired-samples t-test (see Table 3) showed no statistically significant difference in students' concentration levels before and after PE lessons ($t(144) = -1.34$; $p = 0.181$). The effect size (Cohen's $d = -0.11$) was extremely small, and the 95% confidence interval included zero $[-0.28; 0.05]$, indicating that the observed difference is not reliably distinguishable from random variation. These findings suggest that, in this sample, students' subjective assessments do not indicate a meaningful short-term effect of PE classes on concentration.

However, this result does not rule out the possibility of longer-term positive effects of physical activity on attention and academic performance. It merely suggests that the immediate impact of PE on concentration was not perceived by students as substantial in the context of this study. One possible explanation is that other factors influencing concentration (e.g., fatigue, student motivation, time of day, or the nature of the preceding subject) may exert a stronger influence than the proximity of the PE lesson.

N	t	df	p	Cohen's d	95% CI (d)
145	-1.37	144	0.174	-0.11	[-0.28 ; 0.05]

Tab 3. Results of the paired-samples t-test

When examining the grades separately, no statistically significant differences were found in students' concentration levels before and after PE lessons (see Table 4). The results were as follows:

Grade	N	t	p
5.	45	-1.19	0.241
6.	27	1.73	0.095
7.	8	1.16	0.285
8.	65	1.43	0.159

Tab 4. Grade-level comparison of classroom concentration before and after PE lessons

Although the grade 6 group showed a weak tendency suggesting a slightly higher level of concentration after PE, this effect did not reach the threshold of statistical significance.

The usefulness of PE lessons was also examined by grade level, gender, and sporting habits using chi-square tests. The analyses revealed no statistically significant differences between:

Comparison	χ^2	df	p	N
Grade level × perceived usefulness of PE lessons	8.41	9	0.494	145
Gender × perceived usefulness of PE lessons	2.91	3	0.406	145
Sporting habits × perceived usefulness of PE lessons	5.10	3	0.164	145

Tab 5. Evaluation of the perceived usefulness of PE lessons by grade level, gender, and sporting habits

While descriptive statistics indicated minor trends – for example, students who exercise regularly were more likely to report that PE is “always useful” – these tendencies did not prove statistically significant. This uniformity highlights that PE lessons are valued across the entire student population, regardless of background variables.

Nevertheless, future research may be warranted to explore how long-term sporting habits influence students’ attitudes toward PE and whether gender- or grade-related differences emerge more clearly in other contexts (e.g., motivation, enjoyment).

Discussion and Conclusions

The results of our study confirm that sports and physical education play an important role in the lives of primary school students. The majority of students have a positive attitude toward physical activity, and parents also demonstrate a supportive stance, which provides a favourable starting point for the implementation of regular physical activity within the school setting. This uniformly positive attitude suggests that PE continues to be an educational domain closely linked not only to physical health but also to personality development and shared social experiences. School-based PE, therefore, is not merely a subject, but a formative activity that can influence students’ lives in the long term.

Our findings indicate that in this sample, students’ subjective evaluations revealed no statistically significant short-term effect of PE on concentration. Furthermore, students’ perceptions of the cognitive benefits of physical activity did not differ significantly by gender or age group, thus our hypotheses were not confirmed.

Nevertheless, the results also reveal that students do not clearly perceive any immediate impact of PE on their concentration. While short-term cognitive benefits were not statistically detectable in this sample, this does not mean that physical activity has no positive long-term effects on learning. Numerous prior studies have shown that regular movement contributes to improvements in attention, memory,

and problem-solving skills, while also reduces stress and enhances psychological well-being (Szalai et al., 2023; Szeifert, 2024; Széplaki, 2024). It is therefore conceivable that the immediate effects of PE may be less measurable, but its regularity serves as a background factor that gradually becomes embedded in students' academic performances and lifestyles.

It is also worth highlighting that this developmental period is critical for shaping attitudes and habits. If students experience the joy of movement and recognise its benefits through PE, they are more likely to adopt a lifestyle in which sports remain a long-term component. This is important not only for their health but also indirectly for their academic success and overall school performance. Positive, enjoyable PE experiences may help students regard regular physical activity as an integral part of their daily lives and value it beyond the school years.

Our data also show that most students consider PE lessons to be useful, regardless of grade, gender, or sporting habits. This homogeneity reinforces the shared educational value of PE while also pointing to the importance of differentiation and diverse curricular and methodological approaches in the future. Given the varied interests and motivational profiles of students, it is essential to offer enjoyable and challenging physical activities for all within the school framework.

Overall, we believe that the importance of PE lessons lies not primarily in their immediate impact on concentration, but in their contribution to fostering a lifestyle and mindset that support students' long-term physical, emotional, and cognitive development. The regularity of movement, shared experiences, competitive situations, and cooperation all support the development of social skills that are also crucial for academic success. Thus, PE is not an isolated school subject but an integrative factor closely connected to broader educational and developmental goals.

Future research should focus on exploring long-term effects and identifying which types of physical activity and lesson structures best support improvements in students' cognitive performance. Additionally, it would be worthwhile to compare students' subjective perceptions with objective performance indicators, such as academic results or attention and memory tests. This would provide a more precise picture of the extent to which PE directly contributes to academic success.

In contrast to previous findings (Daniel et al. 2022; Bartholomew 2011; Kertész 2022), however, students themselves did not report perceiving a positive impact of physical activity on their academic performance, concentration, or learning outcomes. This dissonance highlights the need for schools and teachers to intentionally emphasise the cognitive benefits of physical activity and to help students recognise the connection between movement and academic success. To support this, it would be worthwhile to introduce school programs that actively involve students in recognising the impact of physical activity on cognitive functions (e.g., learning outcomes). In our view, there is a need to make the beneficial effects of physical activity more consciously understood by students – not only in terms of motor skill development but also in relation to cognitive development. If PE and sports can be framed in this broader context, students may come to view regular physical activity not just as a mandatory subject, but as a key element of their personal development.

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